

EECS 122: Homework 1

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Due: 02/01/2007

Question 1:

If the solid curve in Figure 1 represents $\sin(2\pi t)$, what does the dotted curve represent? That is, the dotted curve can be written in the form $A \sin(2\pi f t + \psi)$; what are A , f and ψ ?

Question 2:

Show that doubling the transmission frequency or doubling the distance between transmitter and receiver attenuates the power received by 6 dB.

Question 3:

Stories abound of people who receive radio signals in fillings in their teeth. Suppose you have only filling that is 2.5 mm long that acts as a radio antenna. That is, it is equal to one-half the wavelength. What frequency do you receive?

Question 4:

A PCM encoder accepts a signal with full-scale voltage of 10 V and generates 8-bit codes using uniform quantization. The maximum normalized quantized voltage is $1 - 2^{-8}$. Determine (a) actual step size in volts and (b) actual resolution.

Question 5:

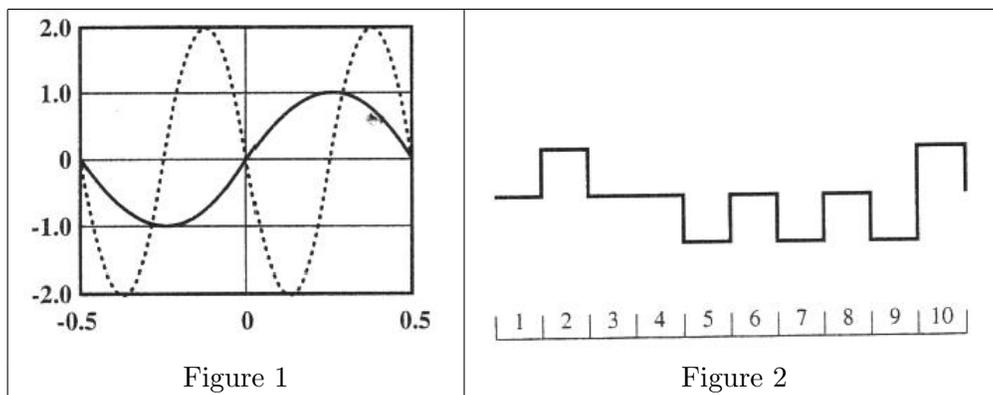
Suppose that data are stored on 1.4-Mbyte floppy diskettes that weigh 30g. Suppose that an airliner carries 10^4 of these floppies at a speed of 1000 km/h over a distance of 5000 km. What is the data transmission rate in bits per second of this system?

Question 6:

For the bit stream 01001110, sketch the waveforms for each of following codes: NRZ-L, NRZI, Bipolar-AMI, pseudoternary, Manchester and differential Manchester. Assume that the signal level for the preceding bit for NRZI was high; the most recent preceding 1 bit for AMI has a negative voltage; and the most recent preceding 0 bit for pseudoternary has a negative voltage.

Question 7:

The bipolar AMI waveform representing the binary sequence 0100101011 is transmitted over a noisy channel. The received waveform is shown in Figure 2; it contains a single error. Locate the position of this error and explain your answer.



Credits : William Stallings